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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/511,644	10/18/2004	Srikanth Gopalan	0108449.00128US2	6246

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WILMER CUTLER PICKERING HALE AND DORR LLP
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BOSTON, MA 02109

EXAMINER	
GREENE, JASON M	
ART UNIT	PAPER NUMBER
1724	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	01/17/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 01/17/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/511,644	GOPALAN ET AL.	
	Examiner	Art Unit	
	Jason M. Greene	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4 and 6-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,8,13 and 14* is/are rejected.

7)☒ Claim(s) *4,6,7 and 9-12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 October 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/8/05;10/16/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wachsman et al. '417 (US 6,235,417 B1) in view of Edlund et al. (US 5,217,506).

Wachsman et al. '417 discloses a process for purifying hydrogen from a stream of reformate gases comprising preparing a flow cell in which 2 gas flows are separated by a two-phase solid state membrane, wherein the first phase is ionically conducting and the second phase is electronically conducting, heating the cell to greater than 500 ^{0}C (up to 700 ^{0}C), passing the reformate gas on one side of the membrane, and separating the purified hydrogen from the second side of the membrane, wherein the reformate gases consist of mixtures of carbon monoxide and hydrogen (synthesis gas), and wherein the second phase of the membrane is Pd in Figs. 1 and 4 and col. 3, line 1 to col. 4, line 62.

Wachsman et al. '417 does not disclose passing steam on the second side of the membrane.

Edlund et al. discloses a similar process wherein steam is passed on the second (permeate) side of membrane to serve as a sweep gas in Fig. 8 and col. 6, lines 3-12.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steam sweep gas of Edlund et al. into the process of Wachsman et al. '417 to assist in removal of hydrogen from the permeate side of the membrane cell to increase hydrogen permeation by lowering the partial pressure of hydrogen on the permeate side, as is well known in the art.

3. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wachsman et al. '417 (US 6,235,417 B1) in view of Edlund et al. (US 5,217,506). Wachsman et al. '417 discloses a system for purifying hydrogen gas comprising a source of reforming gas, a flow cell comprising a first oxidizing compartment and a second reducing compartment separated by a two-phase solid state membrane, wherein the first phase is ionically conducting and the second phase is electronically conducting, and means for directing the reformate gas across the membrane in the first compartment in Figs. 1 and 4 and col. 3, line 1 to col. 4, line 62.

Wachsman et al. '417 does not disclose a source of steam, means for directing the steam across the membrane in the second compartment, or a condenser downstream from the second compartment for separating steam from hydrogen.

Edlund et al. discloses a similar system comprising a source of steam, means for directing the steam across the membrane in the second compartment, and a condenser

downstream from the second compartment for separating steam from hydrogen in Fig. 8 and col. 6, lines 3-12.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steam sweep gas of Edlund et al. into the system of Wachsman et al. '417 to assist in removal of hydrogen from the permeate side of the membrane cell to increase hydrogen permeation by lowering the partial pressure of hydrogen on the permeate side, as is well known in the art.

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over van Hassel et al. (US 6,565,632 B1) in view of Edlund et al. (US 5,217,506).

van Hassel et al. discloses a process for purifying hydrogen (see e.g. col. 2, lines 64-67) from a stream of reformate gases comprising preparing a flow cell in which 2 gas flows are separated by a two-phase solid state membrane consisting of a strontium doped lanthanum iron oxide having the recited composition (see material 1 in Table 1, col. 4, lines 7-8), heating the cell to greater than 500 ^{0}C (up to 1200 ^{0}C), passing the reformate gas on one side of the membrane, and separating the purified hydrogen from the second side of the membrane in col. 2, line 53 to col. 6, line 54.

Wachsman et al. '417 does not disclose passing steam on the second side of the membrane.

Edlund et al. discloses a similar process wherein steam is passed on the second (permeate) side of membrane to serve as a sweep gas in Fig. 8 and col. 6, lines 3-12.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steam sweep gas of Edlund et al. into the process of Wachsman et al. '417 to assist in removal of hydrogen from the permeate side of the membrane cell to increase hydrogen permeation by lowering the partial pressure of hydrogen on the permeate side, as is well known in the art.

Allowable Subject Matter

5. Claims 4, 6, 7 and 9-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claims 4, 6, 7, 9 and 10, the prior art made of record does not teach or fairly suggest the process of claim 1 wherein the first phase is selected from one of the recited compositions.

With regard to claims 11 and 12, the prior art made of record does not teach or fairly suggest the process of claim 1 further comprising including a small amount of hydrogen within the heated stream of reformate gas.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Wachsman et al. '687, Roark et al., Lee et al., Keskar et al., Prasad et al. '163, Prasad et al. '925 and Elangovan et al. disclose similar hydrogen purification systems.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (571) 272-1157. The examiner can normally be reached on Monday - Friday (9:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason M. Greene
Primary Examiner
Art Unit 1724

1/8/07

jmg
January 8, 2007